

Critical Flight Hardware Fabrication

In the spring and summer of 2003, discussions took place between Sandia National Laboratories (SNL) and NASA regarding the possibility of Sandia providing a system to inspect the Shuttle on-orbit for damage. In August 2003, an agreement was reached, and SNL agreed to a staged delivery of six units.

SNL provided to NASA the LASER Dynamic Range Imaging (LDRI) Orbiter Inspection System (LOIS). This system, based on SNL-patented technology, is the primary fully certified Crit 1R System used to inspect the Shuttle on-orbit for damage. The system provides high resolution 2-D intensity images and geometrically accurate 3-D data. A team of Sandians along with their NASA counterparts operate the LOIS Ground Station at the Mission Control Center in Houston. The data is used by the integrated mission management team (SNL and NASA) to detect potential damage, thus assuring the safe return of the crew and vehicle.

The Electro-Optic Imaging Technology Department was the lead SNL organization for this project. The Manufacturing Enterprise (ME) provided machining support for the fabricate-to-print components.

Since the hardware needed to be flight certified, the requirements and processes listed in our ISO quality procedure for "High Rigor" work were used. The Production Coordinator/Process Engineer for the ME managed the fabrication process. The first requirement was for three assemblies: one qualification unit and two flight units. Each assembly involved 33 individual drawings. Given the critical delivery dates, driven by NASA's projected "Return-to-Flight" schedule, the ME team started the fabrication process

before the design was finalized. This project was truly a team effort. Everyone involved in the machining process was acutely aware of the importance of this project. Many personnel made changes to their work schedules including changing/canceling vacation and working overtime so the ME could stay on schedule. For maximum efficiency, the ME involved as many personnel as possible in the fabrication and inspection process. The housing, which is the most critical component, was machined by a team of three machinists which enabled operations in parallel to reduce the cycle time. In all, 45 ME personnel contributed to the project, with a core group of ten tradespersons doing the majority of the work. This core group averaged 220 hours per person, with one person working 370 hours. With everyone working together, the ME was able to deliver components to the customer on schedule. A quality document package was submitted for each part for inclusion in the overall project quality package which was submitted to NASA.

The Shuttle Discovery launched on July 26, 2005. The LOIS system was used by the Discovery astronauts to inspect the Shuttle while in orbit, collecting imagery on virtually all flight days. The system inspected all Reinforced Carbon-Carbon (RCC) and several tile sites. The system performed very well, meeting all objectives. In addition, the SNL team provided image processing for the NASA ITVC camera. The Shuttle crew especially appreciated the SNL inspection capability and felt it was invaluable for their safety. Mission success was realized when the STS-114 crew successfully landed



The LASER Dynamic Range Imaging (LDRI) Orbiter Inspection System (LOIS), top, and an illustration (inset) of it in use at the end of the Shuttle's arm.



The interior of the LASER Dynamic Range Imaging (LDRI) Orbiter Inspection System (LOIS).

Discovery at Edwards AFB. By all accounts, the STS-114 "Return to Flight" mission was very successful.

The LDRI/LOIS – NASA project was an example of the ME at its best. The ME responded rapidly to a request for a critical project, starting the project knowing the design definition was incomplete, and meeting critical delivery dates driven by an external customer. With everyone on the team working together, the ME was able to meet the negotiated delivery requirements.

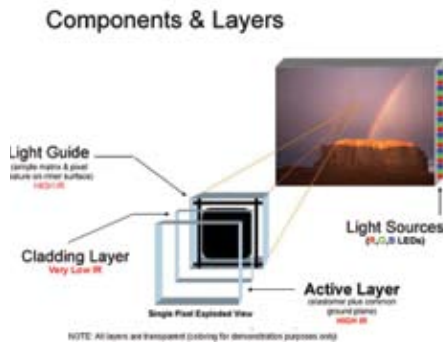
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Tech Updates

LM Shared Vision Project—Flat Panel Displays

A recent Sandia *Lab News* (Sept. 17, 2004, page 12) article noted a great prediction in the *Lab News* from 10 years ago: “Flat panel displays may become the TV screens of the future.” Today, there are large plasma flat panel display TVs and liquid crystal displays (LCDs) used in computer displays, smaller TVs, and cell phones. The article also talked about an initiative to “improve U.S. competitiveness in flat panel displays and advanced information components.” Currently, there are no U.S.-owned manufacturers. The nation depends solely on foreign-owned companies to manufacture the flat panel displays used today for all commercial and military displays.

This may change in the near future. Two Sandia departments, Ceramics and Glass in the Manufacturing S&T Center and Ceramics Processing and Inorganic Materials in the Materials and Process Sciences Center, have been working for the last two years with a small start-up company, Uni-Pixel Displays, Inc., (UPD) to help them build their proof-of-concept flat panel display. UPD has developed an innovative concept for the next generation of display technology. It has the potential to make revolutionary contributions to the national security of the United States by establishing a U.S. manufacturing capability for displays for commercial and military applications. This promising technol-



The flat panel display concept developed by Uni-Pixel Displays, Inc. utilizes a light valve mechanism to control edge injected light emission from the surface of the display.

ogy would reduce reliance on off-shore development and production.

UPD's technology is called Time Multiplexed Optical Shutter (TMOS). It is much simpler than LCDs, with only 5 layers compared to 15. Each pixel will allow red, green, or blue light through the micro-electrical mechanical structure (MEMS). Uni-Pixel's web site (www.uni-pixel.com) has a description of their display technology.

UPD came to Sandia because of our extensive experience (Centers 2400 and 1800) applying sol-gel films on metals, glasses, and plastics for optical and surface modification applications. The Ceramics and Glass Department previously took the lead in applying a sol-gel antireflection coating to the inside and outside of 10-foot-long glass tubes. The department also designed and built equipment to apply a sol-gel

planarizing coating to smooth the surface of a front surfaced 2' x 2' metal mirror. It perfected a sol-gel composition that not only protects but also enhances the optical properties of a Sandia-patented black solar absorbing coating. Ultimately, this sol-gel film was sprayed onto a 6-inch-wide metal web moving at 20 feet/minute.

TMOS uses an aerogel thin film (applied by sol-gel techniques) to separate the glass substrate and the active portion of the display. Currently, no other material meets the performance specifications for refractive index and mechanical strength for the TMOS display. Sandia has a patent on the formulation of the ambient temperature/pressure aerogel film used for the display. This silica aerogel film is over 95% porous and has a refractive index between 1.08 and 1.04.

Lockheed Martin Systems Integration—Owego investigated UPD's TMOS technology and entered into a Shared Vision project with Sandia, focused on the military and aerospace markets, which will result in the development of a prototype display.

The project will also investigate various film properties and processing parameters in order to optimize display performance. Additionally, it will investigate the patterned deposition of the aerogel film and other production activities aimed toward full-scale display production.

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New Sol-Gel CRADA Effort With Industrial Nanotech, Inc.

In January 2005 Sandia and Industrial Nanotech, Inc. (INI) finalized a five-year CRADA to collaboratively improve INI's patent pending nanocomposite insulating/corrosion resistant coating, Nansulate™. INI sells nanotechnology-based materials that enhance the performance characteristics of their coatings primarily designed for the heavy industry, manufacturing, and shipping markets. The company is currently conducting nanoscience-related research in advanced materials, molecular self-assembly, and associated industrial applications.

Sandia will also investigate established self-assembled meso- or nanostructured films as potential

coatings for selected architectural and manufacturing applications and make recommendations for bench-scale manufacturing processes for the improvements to Nansulate™ and the self-assembled coatings.

Fully cured Nansulate™ contains 70% by volume Hydro-NM-Oxide in a water-based acrylic resin with performance additives. It is easily applied by brush, roller, or spray. Hydro-NM-Oxide is one of the world's best insulators with an R-value of 10-12/inch. For comparison fiberglass insulation and polyurethane have R-values of about 3.2/inch and 6.6/inch, respectively. Each coat of Nansulate™ dries to about 0.003 inches thick and three

coats are recommended for maximum effect. Sandia will investigate properties of the Hydro-NM-Oxide composite coatings, optimizing properties and processing parameters, dispersion, viscosity, compatibility with organic matrix formulations, ease of application, mechanical robustness, and environmental stability.

A long-range goal of INI is to re-invest a portion of revenues generated from CRADA-developed technology for further research into nanotechnology for industrial and architectural markets. INI is currently negotiating license agreements for existing Sandia technology.

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High Speed 5 Axis Machining Center—

A new addition in the suite of meso-machining technologies in Mfg. S&T Center



Jim Paustian with 5 axis Willemin 408MT.

In July 2004, the Manufacturing Enterprise (ME) acquired a multi-axis high speed machine tool for precision machining of meso-scale feature sizes and products. The Willemin 408MT is a Swiss-made machining center historically used in the European watch making industry. It has 5 axes (x,y,z,b,c) of motion for milling, turning, and various machining operations utilizing a 0-30,000 rpm milling spindle and 0-6,000 rpm turning spindle. Its axis positioning accuracies are achieved through Heidenhain glass scales with 0.0001mm/0.000004" resolution. Parts can be machined completely on the machine, thereby eliminating multiple setups and additional machine tools.

Qualification for the machine occurred in three phases. The first phase required the manufacturer, Willemin-Macodel, to demonstrate capability by producing a "difficult-to-fabricate" customer-defined part (demonstration wheel) from a CAD model. Secondly, the manufacturer was required to accurately produce two different SNL customer component parts at their facility on the machine tool prior to acceptance and shipment.

Finally, the same two parts were machined in Building 840, Room 165, where the machine tool is currently located, and then measured for final acceptance at Sandia.

In FY05, the ME and Manufacturing Engineering & Process Development

personnel teamed up to tackle a challenging product for SNL's Integrated Surety Mechanisms II department. The Low Mass Mechanism product presented manufacturing challenges in size, feature geometry, and tolerance requirements along with accurate measurement challenges of some features. The processes for fabricating the product required

the Willemin, Wire EDM, Avant Apex Optical measuring machine, and various other measurement equipment. Design iterations occurred in the process of defining an end product that was manufacturable and would meet the customer's intent. Ultimately, component piece parts were



Demonstration wheel, initial qualification part.

produced and delivered. Micro-meso-machining has its learning curve along with its challenges.

In FY06, plans are underway to address those challenges by completing laser alignment for all machine axes and utilizing the error compensation software to fine-tune the machine accuracies. Partnering with customers on future projects will enable us to continue developing this unique meso-machining capability.

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The Mfg. S&T Center Shines in Environmental Management

Environmental Management Systems (EMS) are big news at SNL this year. DOE has required all its facilities to implement an EMS by December 2005. An EMS is a program that ensures an organization reduces environmental impact wherever possible. The Center has had an informal EMS in place since 2002; but because of the DOE requirement, formal objectives and targets were created this year. The Center is a leader at SNL in implementation of its EMS. Although there is a Labs-wide effort to create an EMS for all SNL organizations, the Center was recognized by our DOE EMS counterpart as being a "pocket of excellence" because of its proactive stance on implementation. An EMS team made up of Tim Gardner, Steve Lockwood, Mike Kelly, John Zich, Corey Campbell, Craig Nimmo, Chad Hjorth, Mick Gorospe, and Kristin Klossner meets regularly to discuss and implement actions to meet EMS objectives. Objectives for 2005 were:

- Improve chemical control including purchasing, shelf life management, and reduction of disposal of unused chemicals
- Reduce hazardous waste disposal
- Reduce use of electricity
- Reduce use of chilled and potable water

Several targets were created by the team to meet these objectives. The following targets were completed this year:

- Redesign the lead settling tanks to reduce hazards and waste generation
- Develop a plan and budget for completing energy-saving mechanical and electrical upgrades in the Plastic Lab
- Identify mercury-containing equipment and replace where feasible
- Complete a water conservation survey in Building 878

An important aspect of an EMS is to
(Env. Mgmt. Continued on page 8)

Summer Research Interns Produce Significant Contributions

Sandia's Mfg. S&T Center annually employs a number of students who conduct research with mentors. This is Part II of a report on some of the results the summer interns have achieved.

Retinal Eye Implants

Those lacking the sense of sight may soon be capable of perceiving actual images. To date, retinal eye implants have been inserted in the back of the eyes of volunteer patients where some light perception was gained and black and white images were produced. A CCD microchip which can hold 4,000 to 5,000 solar cells will be placed in a silicone frame, the retinal eye implant. When light strikes the solar cells, it is converted into an electrical signal; it then travels through the optic nerve to the brain where an image will be interpreted. Thus far, there have been positive results and no patients have rejected the implants or showed signs of inflammation or detachment of the retina.

I have processed medical grade silicone frames for a newly designed CCD microchip which are now ready to be tested on animals. Evacuating the mixed resin is essential to remove any air bubbles in the silicone that could irritate the eye. When trimming the frame, it is essential that the flash is completely removed and that the frame is not punctured or cut anywhere. It can affect the patients' vision and the resulting irritation could cause severe damage.

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Summary of Thermal Protection Systems

Hypersonic flight vehicles are exposed to extremely adverse conditions during flight. The material used to make them has to be very light and very strong to withstand the high temperature, high heat flux, and high drag forces of the flight. For this particular project, the material of choice is carbon-carbon composite. They are very strong and are also very lightweight. However, there is one problem with the composites; they are very prone to oxidation at high temperatures. Since we cannot have the outer hull of the plane deteriorating during flight, the focus of the project is to provide adequate oxidation protection for the carbon-carbon under high temperature conditions. Our group is trying to use silicones to infiltrate the pores of the composite. The idea is that the silicones will decompose into SiO_2 (liquid glass) and coat the surface of the material during flight. The purpose of silicones is twofold. It should not only provide the carbon-carbon with oxidation protection but also provide a self-healing coating for the material during flight (as the liquid glass runs off the material, more of it will diffuse up to the surface). There is also another group trying a different method to protect the carbon-carbon by trying to make new ceramic materials to coat the carbon-carbon. The ceramic materials have a great advantage in that they are quite stable at high temperatures, but the downside for their use is the fact that they are too heavy. Thus, trying to make a light ceramic is the challenge for the other side of the project. In the end, the solution might evolve into a combination of the two methods, but much testing needs to be done before that will be realized.

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More on Retinal Implants

The Organic Materials Department's role is to provide molded medical grade silicone frames (shown below) that serve as holders for Micro Electro Mechanical Systems (MEMS) devices used as retinal implants.



Sandia receives ~ \$700K annually for this work, which is funded by the National Nuclear Security Administration (NNSA) Office of Science and Technology. Sandia is part of a Department of Energy Cooperative Research and Development Agreement (CRADA), which includes Argonne, Los Alamos, Lawrence Livermore, and Oak Ridge National Laboratories. Oak Ridge is the lead laboratory. The medical/business partners are the Doheny Eye Institute, which is part of the University of Southern California, and 2nd Sight, who specializes in medical prostheses technology. Together they will produce the retinal implant. Doheny, the leader in retinal implant research along with 2nd Sight, has developed the first active implant to be clinically studied in the United States. The CRADA, as designed, will allow the expertise and the facilities of the national laboratories to help design the next-generation high-resolution retinal implant.

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The Manufacturing Science & Technology Quarterly is produced by a rotating team of Center employees.

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New Peer Review Process

This summer, a Center Peer Review Policy was instituted. David Adams and Pin Yang took the lead to develop this process in an effort to improve overall quality of publications and presentations from the Center. The objective of the Peer Review Process is to critically review the technical aspects of all formal publications such as manuscripts, SAND reports, journal publications, books, invited talks, and conference proceedings. The authors will receive comments on conciseness of their material and contributor acknowledgements as well as constructive feedback to improve the quality of the material. The processes for review are as follows:

Review process for publications:

- Manuscript should first be reviewed by all co-authors, and if possible, the manager of the first author.
- Each publication should be reviewed by at least two reviewers with at least one reviewer from the Center. Technical reviewers may be anyone in the corporation who has been mutually agreed upon by the author and his/her Department Manager. (Technical reviewers cannot be co-authors or the first author's manager).
- The Peer Review Form can be directly downloaded from the Center web page http://mfgtech.sandia.gov/1400_int/peer-review.doc).

- After the review process, revisions will be made at the author's discretion.
- After revisions are made, the document is ready for the Sandia Review and Approval process.

Review process for presentations:

- Presentations should first be reviewed by all co-authors, and if possible, the manager of the first author.
- The presenter should schedule a presentation and invite all Center technical staff, managers, co-authors, contributors and appropriate peers outside the Center.
- The presentation should be scheduled with sufficient time to permit changes and still have sufficient time to go through the Sandia Review and Approval process.
- The author will take comments during and after the presentation. Revisions will be made at the author's discretion.
- After revisions are made, the presentation is ready for the Sandia Review and Approval process.

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Janelle Villone Receives 2005 McMahon Scholar Award

Janelle Villone has been selected as the recipient of the 2005 McMahon Scholar Award for Co-op Achievement at the New York State College of Ceramics at Alfred University (Alfred, NY). This award was established to honor the late John F. McMahon, who always strived that the New York State College of Ceramics consider the vital needs of industry while maintaining a strong academic tradition of fundamental research and education. The Award is presented annually to an undergraduate returning from a cooperative education experience based on a review of their performance by their industry supervisor.

Janelle's co-op experience at Sandia was in the Ceramics and Glass Department (2454) from January to August of this year, working with Scott Reed on investigating chemical and physical processes that control stability in aerogels used to prepare thin-film coatings. She presented her work at the Student Intern Program Symposium in August and completed an impressive comprehensive written report on her work. Janelle received a \$250 cash award on October 13 at Alfred in recognition of this honor. She is scheduled to graduate with a B.S. degree in Materials Science and Engineering in December and is currently pursuing applications to several graduate schools in order to further her studies. Congratulations, Janelle!

Mfg. S&T Recognizes Teaming through Director's Excellence in Teaming Awards

Eleven Teams were recently recognized for their efforts in the new "Director's Excellence in Teaming" awards program. Winners received team celebrations for their outstanding work. There were 139 employees and contractors recognized, along with twelve individuals external to the Center. The winners and their team leaders were as follows:

Digital Signal Processors – Anthony R. Montoya
B61-11 Stockpile Penetrator Case Modifications for Cable Pull Down Development and Surveillance Test – Daryl Reckaway
OST Electronic Support - Anthony R. Montoya
Mfg. S&T ES&H Support – John Zich
Mfg. S&T EMS - John Zich
Mfg. S&T CAS – Linda Wood
Meso-Scale Fabrication – Michael Saavedra
6S Apprentice Phase I – Roy Bonsack
6S Apprentice Phase II – Tom Gutierrez
Satellite Processor Box – Bill Vansalous
LDRI/LOIS Project – Ron Ward

If you are part of a team that has recently excelled in their efforts, consider recognizing them through the Director's Excellence in Teaming awards program. The following link includes additional information, instructions, and the nomination form.

http://mfgtech.sandia.gov/1400_int/teamawards/Default.htm

Rottler, Herrera Stress Operational Excellence

Rethinking the role of nuclear weapons and improving the responsiveness of the Nuclear Weapons Complex are two of the forces that will impact Sandia in the future, remarked Steve Rottler, VP Weapons Engineering and Product Realization, at the Manufacturing Science & Technology Center's All-Hands meeting on October 4th.

Rottler emphasized that the U.S. will continue to maintain a nuclear weapons stockpile. "Most people agree that it is not realistic for this nation to disarm as long as other countries continue to develop and maintain nuclear weapons."

Rottler described a healthy debate at the highest levels within the government. The debate is shaping up along two lines, "Do we keep the weapons we have and refurbish them, as in the W76 and W80 Lifetime Extension Programs, or do we move to a much different path and transform the stockpile and the Nuclear Weapons Complex?"

Rottler noted that a study is underway to identify "reliable, replacement warhead" concepts that would enable us to transform the stockpile into a lower cost, more flexible, inherently sure, and sustainable deterrent force. The study is being conducted by the three nuclear weapon laboratories and the production plants, and will be completed next year. "We have to move to a more responsive nuclear weapon enterprise, and every Center in this Division will be tasked for leadership."

Rottler stressed another important theme for the Mfg. S&T Center: Operational excellence. We are injuring too many people, and this is simply unacceptable, especially given that many accidents are the result of

carelessness or lack of attention. He discussed briefly several key points from his presentation on operational excellence at the Division All-Hands meeting in September. Rottler also discussed the importance of "continuous learning" and urged employees to take positive actions to continuously develop their skills.



Steve Rottler

In closing, Rottler mentioned the importance of our continued support for other Sandia business areas. "A key area is the capability for global strike—that we can hold any adversary's most valued assets,

anywhere on the globe, at risk of immediate attack." Global strike gives the military a flexible set of options, some nuclear, others conventional. "We are planning for a global strike capability. That is an integrated set of capabilities at the full command of the President. Sandia management is working to ensure that we are positioned to support the achievement of this emerging global strike vision."

Mfg. S&T director Gil Herrera followed Rottler. "I want to reiterate the critical importance of operational performance. We need to improve our performance in safety; we must strive for the highest standards achievable. Work controls and training are critical to safe work."

Herrera noted that the Center's ISO efforts provide the tools for improved operational performance and that the Manufacturing Enterprise within the Center has provided a path for others to follow. "Working safely is a

condition of employment. You owe it to yourself and your colleagues to work safely. Injuries impact Sandia." He also noted that safety values are essential away from work.

On the subject of restructuring, Herrera explained why Weapons Engineering and Product Realization (Division 2000) was an appropriate place for the Center. The previous manufacturing division (14000) was a small division which was at one time considered for a spin-off company. "Much has changed since then and, with Sandia undergoing a restructuring, it was appropriate to reconsider our placement within the company. It was appropriate to place us in a Division with many of our key customers, and one which is aligned with Nuclear Weapons, yet has a commitment to the success of the other SMUs."

While located within Weapons Engineering and Product Realization Division, the Center "can work with others; in fact, a balanced portfolio is essential to our health. Over forty percent of our work is for Work for

Other customers. The essence of our Center is to do an exceptional job, deliver on our promises, and focus on customer satisfaction."

Herrera then offered what he called his "Thoughts on being a Sandian." They come from modifications to the corporate overview he gave during a New Hire Orientation session

this summer. Summarized, his points to new employees (and 20- and 30-year Sandia veterans) include:

1. We all serve the nation. We perform a national service in everything we do.

2. Safety matters. You deserve to be safe at work, and safety is a key metric our customers examine closely.



Gil Herrera

3. Security matters. We generate and control materials that are critical to national security.

4. Follow business rules. Ask if you have questions. We have specialists who can answer any question or find an answer. Don't invent answers of convenience.

5. Training matters. Training is important for safe, efficient operations. It is also a key metric for our customers. Do not wait until the last minute to complete your training.

6. Always strive for excellence in everything you do. Sandians take pride in demonstrating excellence in their work, knowledge, and how they meet customer requirements.

7. Partnerships and collegiality are Sandia traditions. The general trend in society seems to de-emphasize partnerships and collegiality. It is important that we maintain our strong traditions at Sandia.

8. Have fun! We do better work if we enjoy what we do. Working at Sandia is a great privilege. It's not just a place that has good salary and benefits; it provides us with an opportunity to serve the nation.

—Peter Nolan

New Permanent Employees

| | |
|-----------------------|-------|
| William Thompson | 24311 |
| Reuben M. Baca | 24332 |
| Delvacchio T. Charley | 24332 |
| Quy D. Dinh | 24332 |
| Isaac T. Garcia | 24341 |
| Kenny M. Gutierrez | 24341 |
| Manuel L. Chavez Jr. | 24311 |
| Shannon M. Delgado | 2434 |
| Kevin M. Schmidt | 2453 |
| Christopher La Pierre | 24541 |

Please welcome them to the Mfg. Science & Technology Center!

The Advanced Manufacturing Processes Laboratory (AMPL) Changes Status to Limited Area



The AMPL, or Building 878, will for the most part become a Limited Area (LA) facility beginning November 29, 2005. Planning for this change in status began in FY04. The changeover was delayed until after three other construction projects within the facility were completed. The building already is home to five Vault Type Rooms. The move back into the limited area was made to better meet an increased demand for sensitive/classified work by customers from all SMUs.

The decision was made to not extend the LA fence line around AMPL due to the continuing need for Property Protection Area (PPA) space to house un-cleared employees. The PPA includes three conference rooms, management offices, and a cubicle area. Construction of the cubicle area was completed in September 2005 after many of the employees residing in that space were relocated to Building 755. The cubicle area contains 25 desktops and 17 kiosks. Additionally, a separate room to house Advanced Manufacturing Trades Trainees including workbenches was also constructed at the same time to house 11 employees and provides an area for Auto Computer-Aided Design training.

What this means for visitors and residents of the building is a more heightened awareness and due diligence in following requirements for both types

of security areas. As an example, use of personal cell phone in a PPA is permitted but not allowed in a LA. Employees were asked to leave their personal cell phones in their vehicles. Coin-operated lockers have been installed in the PPA area of AMPL for use by visitors and employees who inadvertently bring personal cell phones and have no place to secure them prior to crossing the boundaries into the LA.

Marc Evans, Facilities project manager for modifications of the structure to separate LA and PPA, worked with Larry Chavez and Paul Keller from Physical Security and Joe Gullick and Lonnie Atencio of Electronic Security to ensure all DOE requirements were met during the construction phase. Paul and Larry were also responsible for ensuring the building was secured before the final activation. Charles Montoya, Paul Keller, Nancy Aldridge, Vic Webb, Fran Armijo, and Reggie Tibbetts provided an hour-long session, "Making the Transition from Property Protection Area to Limited Area," for employees housed in AMPL.

Thanks in advance for your cooperation and diligence as we make this transition.

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Manufacturing Science and Technology Center Adopts NetSkillSystems

The Mfg. S&T Center has completed installation of a state-of-the-art workforce skills development system. NetSkillSystems (NSS) is a standards-based process through which a production site integrates the main elements of workforce development into a unified, comprehensive system.

The managers and tradespersons from the Center have been working methodically with an NSS Team since this spring on the NSS process. After first defining workforce development goals and customer expectations, managers of each trade group met together to create standards for core skills common across the Center. For this purpose, the managers customized the federally-recognized, high-performance standards published by the Manufacturing Skill Standards Council (MSSC) to meet Center-wide manufacturing requirements.

The managers then used a similar process to draft specialized standards unique to their own groups: Ceramics, Electronic Fabrication, Ma-

chining, Mechanical Measurements, Organic Materials, and Thin Film, Vacuum & Packaging. For validation purposes, both core and specialized standards were posted for comment by the tradespersons.

The next step was to have the tradespersons and apprentices from each group make a self-assessment of the importance of those standards, their own ability to perform against them, and their perceived need for training. On the basis of those assessments, NSS was able to perform an accurate skills gap analysis.

That analysis then served as the basis for meetings with the six managers to identify ways to close those gaps, either through ongoing activities or through new training and process improvement measures. This resulted in an action plan and timetable for addressing those gaps that required attention within the coming months.

Most importantly, the Center has assigned personnel who will maintain this system over time by checking on

progress on the action plan, maintaining standards documentation, and ensuring that standards are updated to respond to future changes in production requirements at the Center. The primary responsibility for this ongoing function will rest with the Advanced Manufacturing Trades Training Coordinator, Juanita Sanchez, who will be the technical lead and repository for the Center standards.

Now that the NSS system has been successfully installed, it can be used to meet ISO, NNSA, and New Mexico state requirements for workforce skills and training documentation. It can also be used as a foundation for multiple workforce purposes including recruitment criteria, job descriptions, skills assessment, targeted, just-in-time training, forecasting skill needs, and as a means to help educators align their curriculum to specific skill needs at the Center.

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Things to Consider the Next Time You Use an SNL Copier

Beginning in FY06 the cost of copy paper and the copies made on Sandia-furnished Konica copiers will be billed to the organizations, as opposed to being furnished by the Integrated Enabling Services (IES). The reason stated for the change was to better align costs with the appropriate using organizations. The IES will continue to cover the lease costs for base model copiers as well as maintenance, service calls, and all consumables other than paper (toner cartridges, fusers, etc.). New to FY06 will be the addition of color copiers to the copier fleet. There will, however, be an additional charge to the line organization for high-end copiers, which include color copiers and high-speed black & white copiers.

The Mfg. S&T Center leases ten copiers that are located in three major buildings.

Employees with printers should order their own copy paper through their Office Administrative Assistant as opposed to removing paper from the copier areas.

Every employee should practice conservation:

- Make only the number of copies needed
- Make double-sided copies whenever possible
- Make copies of presentations by using the feature of multiple slides to a page

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encourage employee participation in the system. ESSP bucks have been made available to employees making suggestions to improve environmental performance. Presentations were made at department meetings in July to familiarize everyone with the aspects and impacts. Several suggestions were made for which participants received ESSP Bucks.

These activities caused a very positive response in a recent audit conducted by ES&H, Quality, and Safeguards & Security Assessments. Although a formal audit report has not been received, the auditor verbally commended the Center for its EMS activities.

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